

REMARKS

Reconsideration of this application is requested. Claims 1-7 remain active in the application subsequent to entry of this Amendment.

Restriction was required in this application and counsel affirms the election of Group I, that is claims 1-7 drawn to an electrode for an alkaline storage battery. Claims 8-22 remain in the application but have been withdrawn from consideration and may either be rejoined to the product claims, once allowed, or made the subject of a divisional application.

The specification has been amended as requested by the examiner in item 6 of the Official Action and, for convenience, a substitute specification is attached. The substitute specification merely corrects form of presentation, syntax and generally clarifies the disclosure but does not present added subject matter. A marked up copy of the specification as revised is also attached to illustrate the changes made.

The claims have been amended in order to more particularly point out and distinctly claim that which applicants regard as their invention. Claim 1 has been clarified and both claim 1 and claim 2 have been amended to refer to the resin as being thermoplastic, which is consistent with the remaining claims, notably claims 5-7, as well as the description of this resin at page 4, line 2 (and elsewhere). No new matter is involved with these changes.

The remaining issue in the Official Action relates to the rejection of claims 1-7 as being anticipated by U.S. patent 5,750,287 to Kinoshita et al. This rejection is respectfully traversed on the basis of the above claim amendments and following comments.

The present invention is related to improvements in binders used in alkaline storage batteries. As discussed in their specification in particular at page 3, line 7 to page 4, line 1, the objectives of the invention are unique to solving problems associated with alkaline storage batteries. In particular, the invention is directed to preventing the active

material such as hydrogen absorbing metal alloys from being removed from the electrode substrate. Removal of these materials may be caused by water vapor in the surrounding atmosphere or by aqueous liquids in the alkaline electrolyte within the battery.

The electrodes of the present invention are intended for alkaline storage batteries such as nickel-metal hydride batteries and nickel-cadmium batteries and are based upon the use of a metal or metal alloy known to have hydrogen storing or absorbing abilities. These electrodes are prepared by making a paste or slurry of the relevant hydrogen absorbing alloy and a suitable binding material. They may be applied either as a paste, as a slurry, or a dispersion. Applicants set out to solve problems of retaining the hydrogen absorbing metal alloy on the electrode substrate through processing, for instance when exposed to the water vapor in atmospheric air, or inside the alkaline storage battery which itself contains a proportion of water, the object being to protect the electrode.

The Kinoshita reference applied by the examiner is concerned with a very different type of structure, namely an organic electrolytic cell using a metallic oxide as the positive electrode and metallic lithium or a lithium alloy as the negative electrode. According to the reference itself, these types of cells are "used in place of Ni-Cd storage cells and alleged storage cells, because of (their) high energy density" see column 1, lines 13 and 14. Kinoshita is concerned with addressing issues relating to deterioration of the negative electrode containing lithium which degrades into mossy lithium, also called dendrites which are formed through repeated charge and discharge cycles – see column 1, lines 20-22.

The reference itself clearly states the type of cell involved:

"The cell is a so-called rocking chair-type cell wherein after assembly of the cell, lithium is supplied from the lithium-containing metallic oxide as the positive electrode to the negative electrode through charge, and lithium of the negative electrode is returned to the positive electrode through discharge" – See column 1, lines 30-35.

Kinoshita's improvement resides in providing an infusible, insoluble substrate for receiving the active material. This substrate has a polyacene type skeletal structure which is infusible, insoluble and stably facilitates doping of the substrate with lithium (which is the active material) from the outside of the electrode and this, in turn makes it possible to conduct doping and undoping of the lithium.

Kinoshita's negative electrode, being infusible and insoluble, is composed of a polyacene type skeletal structure which is said to be a heat-treated product of an aromatic condensation polymer which is referred to in the patent as PAS. The examiner directs attention to various portions of column 2 of the reference in which the aromatic condensation polymers are discussed. While it is true that the word "xylene" and the word "formaldehyde" are both mentioned in column 2 at lines 49 and 55, respectively, it is far from clear, in fact it is totally unclear, that thermoplastic xylene-formaldehyde resins, in particular alkylphenyl-modified xylene-formaldehyde resins are described. Even assuming for the sake of argument such resins are described (which counsel does not agree with), it is clear that these materials are used to form the skeletal structure of infusible, insoluble material which forms the negative electrode.

By contrast, applicants' claims are directed to the use of a thermoplastic xylene-formaldehyde resin which is a component of the **binder** and, together with the active material, forms the main component of the active material layer which is formed on an electrode substrate.

The Kinoshita reference also discusses the possibility of the presence of a binder in the infusible, insoluble substrate having a skeletal structure – see the discussion beginning at column 3, line 45. Kinoshita uses a fluorine-based binder and various examples of such binders are given in the last paragraph of column 3 of that reference. Choice of the binder is again related to the desirability to adequately dope the electrode substrate with lithium – see the first three lines of column 4 of the reference. Clearly there are distinctions in structure and composition as between the binders used in the Kinoshita reference and the binder used in the present application.

In like manner, Kinoshita is concerned with electrodes composed of an infusible, insoluble substrate having a polyacene type skeletal structure in order to control the amount of lithium in the cell. The materials employed in the present invention, particularly the components of the binder, are distinct from the disclosures of the Kinoshita reference, hence anticipation has not been established.

According to the present invention, coupling between the substrate and the material filled in it is enhanced by the binder. On the other hand, according to Kinoshita, mobility of the material received in the substrate is enhanced by the infusible, insoluble substrate, but coupling between the substrate and the material contained in it is not enhanced. That is, the passage pointed out by the examiner is quite different from the binder as claimed.

Applicants also submit that the examiner is attempting to rely upon a document from a very different and distinct area of electrolytic cells – Kinoshita is concerned with organic electrolyte batteries yet the examiner is attempting to apply the description in this document to a separately developed art area of alkaline storage batteries. It is also argued, without any support, factual or otherwise, that one may simply interchange the two technologies and the materials used in them. This is not the case. The problems in Kinoshita's area of organic electrolytic cells are quite different from the technology associated with alkaline storage batteries nor does the record of this application demonstrating similarities exist (they do not).

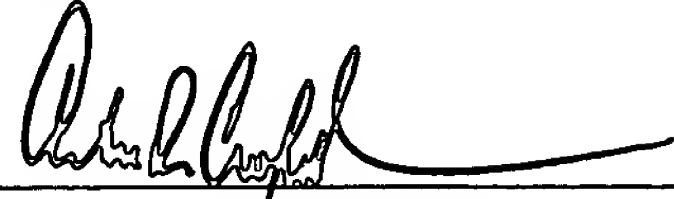
For the above reasons it is respectfully submitted that the claims of this application define inventive subject matter. Reconsideration and allowance are solicited.

MURATA et al.
Sèrial Nò. 09/813,967
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Respectfully submitted,

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